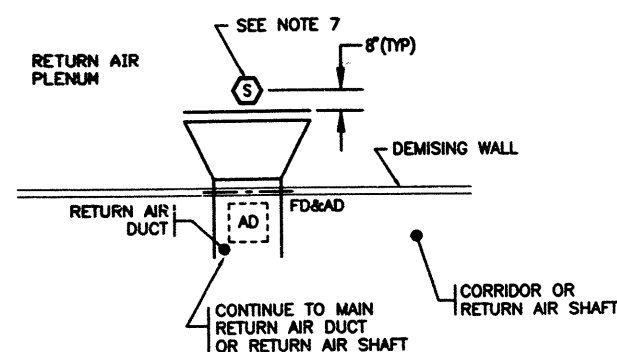
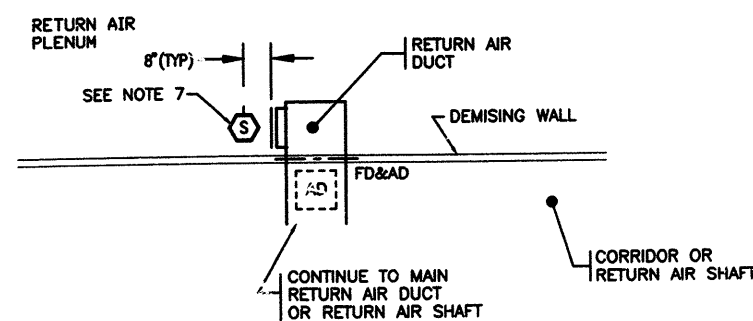


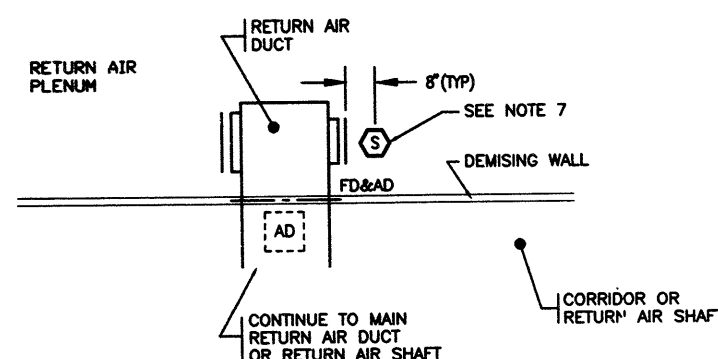
RETURN AIR SMOKE DETECTORS INSTALLATION NOTES.



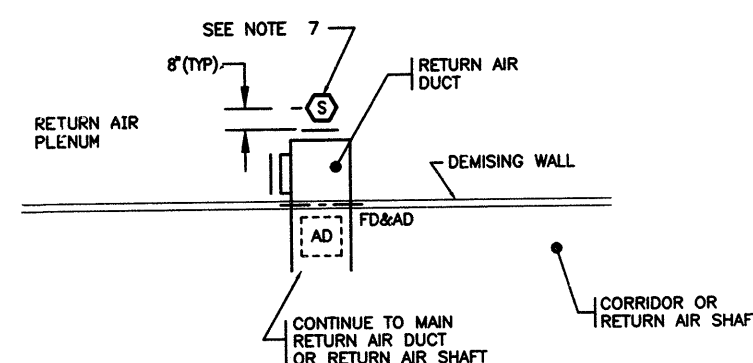
TYPICAL ARRANGEMENT PART PLAN "1A"



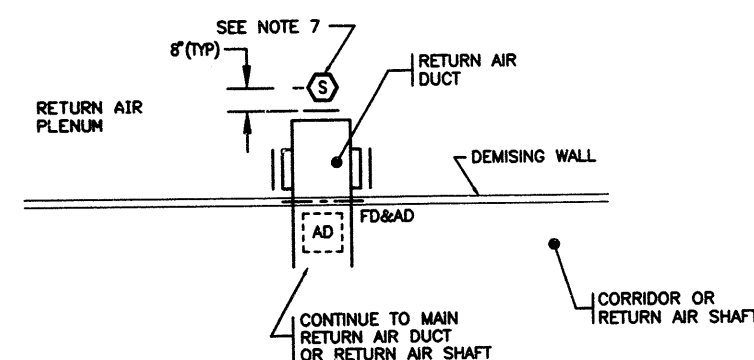
TYPICAL ARRANGEMENT PART PLAN "1B"



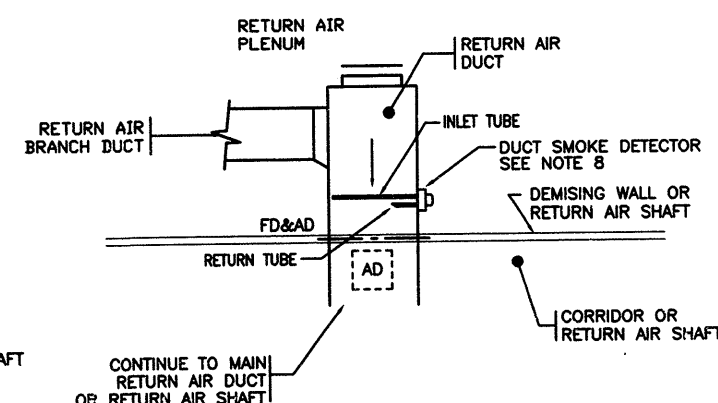
TYPICAL ARRANGEMENT PART PLAN "2A"



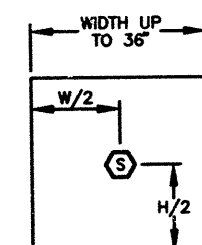
TYPICAL ARRANGEMENT PART PLAN "2B"



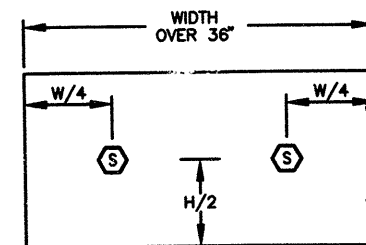
TYPICAL ARRANGEMENT PART PLAN "3"



TYPICAL ARRANGEMENT PART PLAN "4"



TYPICAL ARRANGEMENT ELEVATION "X"



TYPICAL ARRANGEMENT ELEVATION "Y"

SAMPLING TUBE SCHEDULE			
DUCT WIDTH RANGE	MODEL	ACTUAL TUBE LENGTH	REMARKS
9" - 1'-9"	STA-2	2 FT.	SEE DWG E-1
1'-9" - 3'-3"	STA-3	3 FT. - 6 IN.	
3'-3" - 6'-3"	STA-6	6 FT. - 6 IN.	
6'-3" - 9'-9"	STA-10	10 FT.	

NOTE: IF NECESSARY, TRIM THE INLET SAMPLING TUBE PER MANUFACTURER'S RECOMMENDATIONS.

LEGEND	
	INSTALL NEW
	EXISTING DUCTWORK
	EXISTING VOLUME DAMPER
	EXISTING DUCT WITH FIRE DAMPER
	EXISTING DUCT WITH RETURN GRILLE
	FIRE DAMPER AND ACCESS DOOR
	NEW SMOKE DETECTOR
	FIRE DAMPER
	DUCT HEIGHT
	DUCT WIDTH
	EXISTING ACCESS DOOR

- SMOKE DETECTORS ARE TO BE INSTALLED AT EACH CONNECTION TO THE RETURN AIR SHAFTS ABOVE THE FINISHED HUNG CEILING, EITHER IN FRONT OF THE RETURN AIR GRILLE OPENING(S) OR WITHIN THE RETURN AIR DUCT, AS INDICATED ON THIS DRAWING.
- REFER TO ELECTRICAL DRAWINGS FOR LOCATIONS, DETAILS AND SPECIFICATIONS OF THE SMOKE DETECTORS. THE CONTRACTOR SHALL FURNISH AND INSTALL ALL SMOKE DETECTORS IDENTIFIED ON THE ELECTRICAL DRAWINGS AND ADDITIONAL SMOKE DETECTORS AS MAY BE REQUIRED AS A RESULT OF THE CONTRACTOR'S FIELD SURVEY (SEE NOTE #3) AND IN CONFORMANCE WITH THE NOTES ON THIS DRAWING. THE INSTALLATION OF ADDITIONAL SMOKE DETECTORS THAT ARE NOT IDENTIFIED ON THE ELECTRICAL DRAWINGS ARE TO BE PERFORMED UNDER THE "NET COST" PROVISIONS OF THIS CONTRACT.
- THE CONTRACTOR SHALL FIELD SURVEY THE LOCATIONS AND SIZES OF THE RETURN AIR DUCTS AND GRILLE OPENINGS ABOVE THE FINISHED HUNG CEILING TO VERIFY AND DETERMINE THE LOCATIONS AND THE NUMBER OF SMOKE DETECTORS BASED ON THE CRITERIA SET FORTH BY THE NOTES ON THIS DRAWING. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY DEVIATION FROM THE TYPICAL ARRANGEMENT PART PLANS DUE TO ACTUAL FIELD CONDITIONS.
- PRIOR TO THE INSTALLATION OF ADDITIONAL SMOKE DETECTORS THAT ARE NOT IDENTIFIED ON THE ELECTRICAL DRAWINGS, THE CONTRACTOR SHALL RECEIVE APPROVAL FROM THE ENGINEER. THE CONTRACTOR SHALL PROGRAM THE ADDITIONAL SMOKE DETECTORS WITH ADDRESSES TO BE ASSIGNED BY THE ENGINEER.
- ALL SMOKE DETECTORS SHALL BE INSTALLED IN CONFORMANCE WITH MANUFACTURER'S RECOMMENDATIONS, AND AS APPROVED BY THE ENGINEER.
- SMOKE DETECTORS TO BE INSTALLED IN FRONT OF RETURN AIR GRILLE OPENINGS SHALL BE DESIGNED FOR HIGH AIR VELOCITY APPLICATION, WITH A RANGE FROM 0 TO 1,200 FEET PER MINUTE, AS SPECIFIED ON THE DRAWING E-1. SMOKE DETECTORS TO BE INSTALLED WITHIN DUCTWORK SHALL BE DESIGNED FOR A HIGH VELOCITY OF 500 TO 4000 FEET PER MINUTE, AS SPECIFIED ON DRAWING E-1.
- FOR RETURN AIR GRILLE OPENING ASSOCIATED WITH DUCTWORK THAT EXTENDS LESS THAN 15 FEET FROM THE RETURN AIR SHAFT, SMOKE DETECTOR(S) SHALL BE INSTALLED IN THE CEILING PLENUM, 8" IN FRONT OF THE RETURN AIR GRILLE OPENING, AND AT THE CENTERLINE OF THE OPENING HEIGHT. FOR RETURN AIR GRILLE OPENING OF A WIDTH EQUAL OR LESS THAN 36", PROVIDE ONE (1) SMOKE DETECTOR AS SHOWN ON TYPICAL ARRANGEMENT ELEVATION "X". FOR RETURN AIR GRILLE OPENING OF A WIDTH GREATER THAN 36", PROVIDE TWO (2) SMOKE DETECTORS AS SHOWN ON TYPICAL ARRANGEMENT ELEVATION "Y". IN ADDITION, THE PLACEMENT OF THE SMOKE DETECTOR(S) FOR THE DIFFERENT RETURN AIR GRILLE CONFIGURATIONS SHALL BE AS FOLLOWS:
 - FOR RETURN AIR DUCT WITH A SINGLE RETURN AIR GRILLE OPENING, INSTALL SMOKE DETECTOR(S) AS SHOWN ON TYPICAL ARRANGEMENT PART PLANS "1A" AND "1B".
 - FOR RETURN AIR DUCT WITH TWO (2) RETURN AIR GRILLE OPENINGS, SMOKE DETECTOR(S) SHALL ONLY BE INSTALLED IN FRONT OF THE SMALLER OPENING AS SHOWN ON TYPICAL ARRANGEMENT PART PLANS "2A" AND "2B".
 - FOR RETURN AIR DUCT WITH THREE (3) RETURN AIR GRILLE OPENINGS, SMOKE DETECTOR(S) SHALL ONLY BE INSTALLED IN FRONT OF THE CENTER OPENING AS SHOWN ON TYPICAL ARRANGEMENT PART PLAN "3".
- FOR ANY RETURN AIR DUCTWORK THAT HAS NO GRILLE OPENING ABOVE THE FINISHED HUNG CEILING OR HAS A TOTAL LENGTH OF 15 FEET OR MORE FROM THE RETURN AIR SHAFT, DUCT MOUNTED SMOKE DETECTOR(S) SHALL BE INSTALLED AT THE CENTER LINE OF THE DUCT HEIGHT AND AS CLOSE AS POSSIBLE TO SIX (6) DUCT WIDTHS FROM THE NEAREST RETURN AIR INLET OR BRANCH DUCT. SELECTION OF SAMPLING TUBE LENGTH SHALL BE AS INDICATED IN THE SAMPLING TUBE SCHEDULE.
- DO NOT INSTALL SMOKE DETECTORS AT TRANSFER AIR OR SUPPLY AIR OPENINGS.
- ANY WORK TO BE PERFORMED THAT REQUIRES AN HVAC EQUIPMENT SHUTDOWN OR INTERRUPTION TO NORMAL OPERATION SHALL BE PERFORMED OUTSIDE OF WORKING HOURS, AS DEFINED IN DIVISION 1 OF CONTRACT SPECIFICATIONS OR AS DIRECTED BY THE ENGINEER. THE CONTRACTOR SHALL NOTIFY THE AUTHORITY OF ANY EQUIPMENT SHUTDOWN 48 HOURS PRIOR TO THE FIELD WORK.
- UPON COMPLETION OF FIELD WORK, THE CONTRACTOR SHALL MARK-UP AND SUBMIT A SET OF CONTRACT DRAWINGS INDICATING THE LOCATIONS AND ADDRESSES OF ALL SMOKE DETECTORS INSTALLED BY HIM, INCLUDING THE DIMENSIONS AND CONFIGURATIONS OF ALL RETURN AIR DUCTS AND GRILLE OPENINGS WHERE SMOKE DETECTORS ARE REQUIRED.

WHEREBY CERTIFY THAT THIS IS A TRUE AND CORRECT COPY OF ONE OF THE CONTRACT DRAWINGS CONSTITUTING A PART OF CONTRACT NO. WTC-861.573 IN THE FORM IN WHICH SAID DRAWINGS WERE PREPARED AT THE TIME THE SAID CONTRACT WAS EXECUTED BY THE PARTIES.

2/1/00 *[Signature]*
2/18/00 *[Signature]*
CONTRACT ENGINEER/ARCH
ENGINEERING PROGRAM MGR.

THE PORT AUTHORITY
OF NEW YORK AND
NEW JERSEY

[Signature]
ENGINEERING PROGRAM MANAGER
WORLD TRADE
CENTER
CHIEF MECHANICAL ENGINEER

No. Date Revision Approved

ENGINEERING DEPARTMENT
DESIGN DIVISION

WORLD
TRADE
CENTER

MECHANICAL
Title
FIRE ALARM SYSTEM
DEVICE UPGRADE
PHASE III
5 WTC 3rd, 4th, 5th & 6th FLOORS

RETURN AIR SMOKE
DETECTORS ARRANGEMENTS
PART PLANS
ELEVATIONS AND NOTES

This drawing subject to conditions in Contract. All inventions, ideas, designs and methods herein are reserved to Port Authority and may not be used without its written consent.

A. YORK R. DUKESHIRE S. WIEWER
Designed by Drawn by Checked by

NOVEMBER 26, 1999
Date

WTC-861.573 M-1
Contract Number Drawing Number